# OPERATING INSTRUCTIONS FOR TYPE G 1000 POTENTIOMETER

TINSLEY

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# FOR TYPE G 1000
# POTENTIOMETER


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# THE G1000 POTENTIOMETER

## INTRODUCTION

This Potentiometer follows the traditional Vernier Principle in its circuitry, in that the lower order dials are supplied with their current by tapping across one section of the upper order dials. To reduce the effect of switch contact resistance having some influence on the calibration of the Potentiometer, the parasite dials are one dial away from the parent dial, reducing the current demand by a factor of ten.

The maximum current passing through any of the Potentiometers dials is 20 milliamps, reducing by a factor of ten with each decade down to the lowest dial.

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The first three dials in the Potentiometer have step values of 5 ohms each and the lower order dials have step values of 1 ohm each, this is to permit great accuracy of adjustment where required and still keep the total resistance of the measuring circuit as low as possible.

The main advantage of a low resistance circuit is to permit the use of low resistance detectors such as the traditional galvanometer amplifier which, due to their low periodic response eliminate common mode pickup.

The only maintenance required with this Potentiometer is an occasional rotation of the switches if the instrument has been out of use for a long period.

SPECIFICATIONS (NORMAL)* ADJUSTMENTS

* (Some of these uncertainties may be reduced after the instrument has aged in service.)

| | | |
|---|---|---|
| DIAL LINEARITY | DIAL 1 | ±2ppm |
| | DIAL 2 | ±3ppm |
| | DIAL 3 | ±5ppm |
| | DIAL 4 | ±10ppm |
| | DIAL 5 | ±50ppm |
| | DIAL 6 | ±100ppm |
| | DIAL 7 | ±1% |

DIAL LINE UP ±5ppm OR ONE LOWEST ORDER STEP, WHICHEVER IS THE GREATER.

STANDARD CELL DIAL ±1ppm

INTERNAL POWER SUPPLY DRIFT RATE IN TEMPERATURE CONTROLLED ROOM APPROXIMATELY 5ppm OVER 8 HOUR PERIOD.

MEASUREMENT RANGE 1.801 111 0 VOLTS IN STEPS OF 0.1 MICROVOLT.

STANDARDISE RANGE 1.018000 VOLTS TO 1.019000 VOLTS

ZERO COMPENSATION APPROXIMATELY 3 MICROVOLTS MAXIMUM

## CONSTRUCTION

The instrument consists of seven decade dials giving a range of 1.811111 Volts in 0.1 microvolt steps.

The standardising circuit is in parallel to the main potentiometer circuit, permitting standardisation at any setting of the measuring dials. This has a range of 1.018000 to 1.019000 volts in 1 microvolt steps.

There are three pairs of terminals on the front panel selectable for measurement connectors.

The galvo series switch has a range of resistances to protect the detector.

The back panel holds a variety of options and controls including:-

1. Galvo input
2. Linked terminals for optional galvo key
3. zero correction control to obtain true zero
4. Zero correction supply battery
5. supply selector switch (3 positions)

   position A.internal supply

   position B.5750 A.C.C.

   position C.2 volt battery

6. Auto coil link terminals. These may be un-linked to include an extra 10 ohms in battery circuit
7. Standard Cell input
8. Main input for internal supply

## SETTING UP PROCEDURE

Plug in Mains supply and switch on

Short out Auto Coil terminals

Short out Remote Key terminals

Switch rear panel Selector switch to "A" Internal Supply

Short out one pair of terminals on front panel

Select that pair of terminals on front panel Selector switch.

Connect galvonometer or detector to the Galvo terminals (back panel)

Reduce Galvo Series resistance on front panel

Balance galvanometer deflection by adjusting "zero correction control" on back panel.

When true balance has been achieved the instrument is ready for use.

## STANDARDISING

A traceable standard cell should be used to standardise the potentiometer and it should be in oil, or otherwise thermally insulated. Connect the Standard Cell to the S.C. terminals on the rear panel. The value of the cell should be set up on the Standard Cell Dial on front panel.

The Selector Switch on front panel must be turned to S.

The Galvo Series is reduced until an out of balance is detected.

The deflection is removed by adjusting the Rheostat coarse, Medium and fine controls on the front panel.

When true balance has been achieved the instrument is standardised.

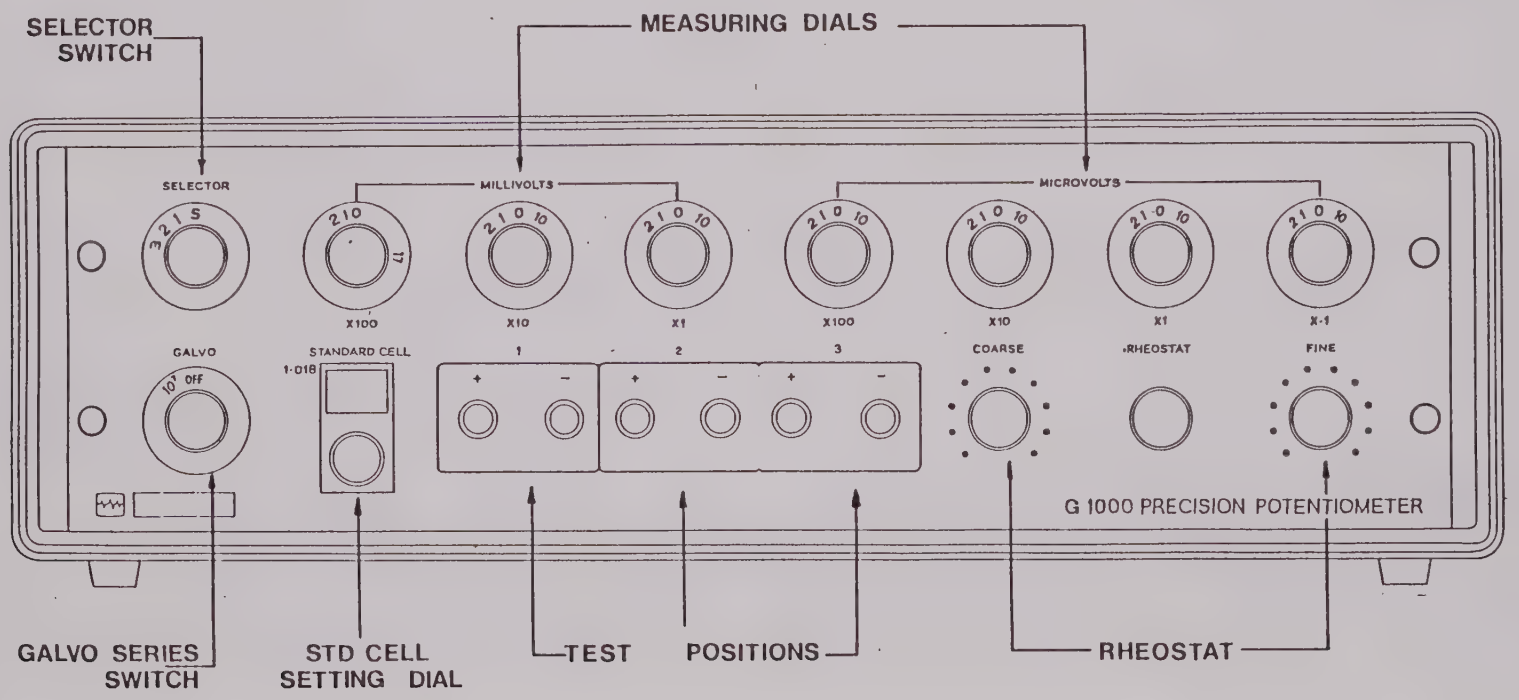
## SUPPLY SELECTION

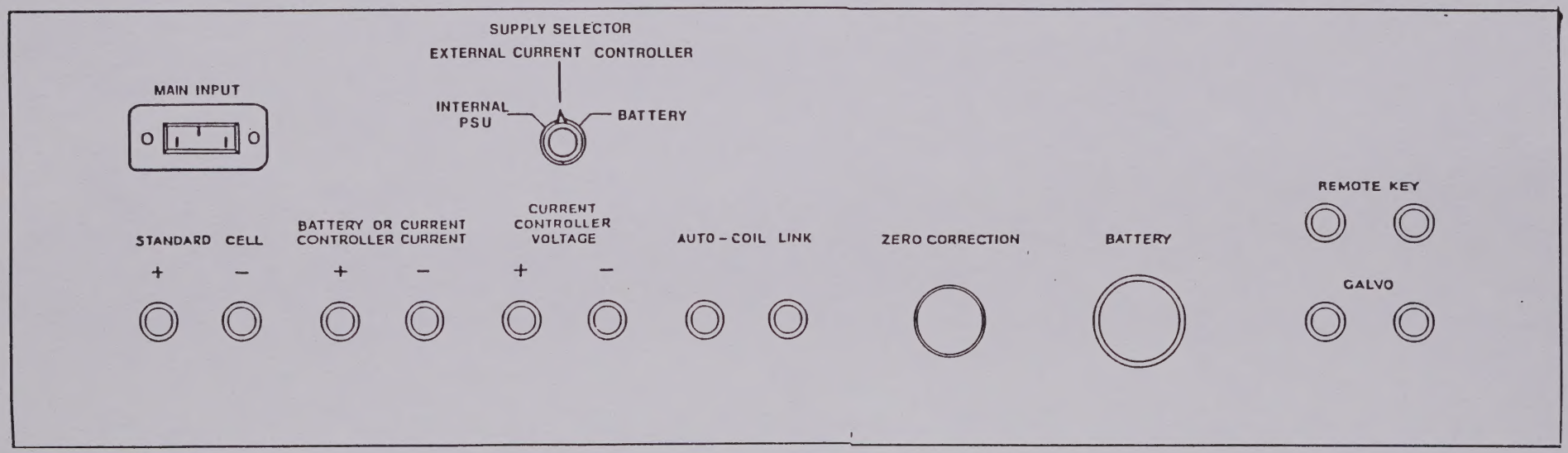
The internal power supply is zener controlled and is temperature compensated to remain stable throughout the warm up period, but the best stability is obtained after one hour of mains switch on. Due to the slight self heating of this supply extra precautions have been taken in the manufacture of this Potentiometer to ensure all the coils in the potential circuit have the same characteristics. They are in fact all produced from the same reel of wire, and baked to anneal and age them at the same time.

The other choices of supply are switchable. Either the traditional 2 volt battery (we recommend 150 AH permanently connected) this would last approximately 1 year between charges. Or the well proven 5750 auto current controller with its direct reference to a standard cell.

## DETECTORS

We recommend a low resistance detector to be used with the G1000 but the more robust electronic detectors may be used successfully.


SELECTOR SWITCH
MEASURING DIALS
SELECTOR
MILLIVOLTS
MICROVOLTS
X100
X10
X1
X100
X10
X1
X·1
GALVO
STANDARD CELL
1·018
1
2
3
COARSE
RHEOSTAT
FINE
G 1000 PRECISION POTENTIOMETER
GALVO SERIES SWITCH
STD CELL SETTING DIAL
TEST
POSITIONS
RHEOSTAT


SUPPLY SELECTOR
EXTERNAL CURRENT CONTROLLER
INTERNAL PSU
BATTERY
MAIN INPUT
REMOTE KEY
STANDARD CELL
BATTERY OR CURRENT CONTROLLER CURRENT
CURRENT CONTROLLER VOLTAGE
AUTO - COIL LINK
ZERO CORRECTION
BATTERY
GALVO
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